

## FORAGE SUITABILITY GROUP

### Clayey

FSG No.: G106XY210NE

Major Land Resource Area: 106X -Nebraska and Kansas Loess-Drift Hills

#### Physiographic Features

Most of the soils in this group are found in upland positions, but some are found on flood plains.

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1000	1650
Slope (percent):	0	25
Flooding:		
Frequency:	None	Occasional
Duration:	None	Brief
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	Very high

#### Climatic Features

Annual precipitation varies widely from year to year in MLRA 106. Average annual precipitation for all climate stations listed below is about 34 inches. About 71 percent of that occurs during the months of April through September. On average there are about 35 days with greater than .1 inches of precipitation during the same time frame. Annual precipitation and temperature increase from the north to the south in the MLRA.

Average annual snowfall ranges from 16 inches at Wamego, KS to 37 inches at Wahoo, NE. Snow cover at depths greater than 1 inch range from 10 days at Holton, KS to 42 days at Auburn, NE.

Average July temperatures are about 79 degrees F., and average January temperatures are about 25 degrees F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -31 at Waho, NE, and a high of 110 recorded at Auburn and Pawnee City in Nebraska and also at Centralia and Holton in Kansas.. The MLRA lies mostly in USDA Plant Hardiness Zones 5a and 5b.

At Topeka, KS, the average annual wind speeds are about 9.7 MPH. The highest wind speeds occur during February through May. It is cloudy about 154 days a year. Average morning relative humidity in June is about 87 percent and average afternoon humidity is 62 percent.

At Lincoln, NE, the average annual wind speeds are about 10.1 MPH. The highest wind speeds occur during March and April. It is cloudy about 149 days a year. Average morning relative humidity in June is about 83 percent and average afternoon humidity is 58 percent.

The climate data listed in the tables below represent high and low ranges and averages for the climate stations and dates listed. For additional climate data access the National Water and Climate Center at <http://www.wcc.nrcs.usda.gov>.

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	<b>From</b>	<b>To</b>
<b>Freeze-free period (28 deg)(days):</b> (9 years in 10 at least)	162	201
<b>Last Killing Freeze in Spring (28 deg):</b> (1 year in 10 later than)	Apr 29	Apr 15
<b>Last Frost in Spring (32 deg):</b> (1 year in 10 later than)	May 10	Apr 22
<b>First Frost in Fall (32 deg):</b> (1 year in 10 earlier than)	Sep 20	Oct 15
<b>First Killing Freeze in Fall (28 deg):</b> (1 year in 10 earlier than)	Oct 01	Oct 26
<b>Length of Growing Season (32 deg)(days):</b> (9 years in 10 at least)	140	183
<b>Growing Degree Days (40 deg):</b>	5742	6961
<b>Growing Degree Days (50 deg):</b>	3881	4376
<b>Annual Minimum Temperature:</b>	-20	-10
<b>Mean annual precipitation (inches):</b>	30	39

## Monthly precipitation (inches) and temperature (F):

<b>2 years in 10:</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>Precip. Less Than</b>	0.25	0.24	0.85	1.36	2.58	1.84	1.69	1.79	1.52	0.83	0.49	0.35
<b>Precip. More Than</b>	1.99	1.61	3.94	4.95	6.62	8.42	6.02	5.71	6.87	5.10	3.62	2.69
<b>Monthly Average:</b>	0.81	0.92	2.38	3.03	4.47	5.00	3.74	4.06	4.18	2.81	1.72	1.19
<b>Temp. Min.</b>	10.8	15.7	27.1	39.6	50.7	60.4	65.5	62.4	52.8	40.3	28.3	15.8
<b>Temp. Max.</b>	39.2	44.7	56.8	68.9	77.4	85.7	91.3	89.4	81.3	70.9	55.5	42.3
<b>Temp. Avg.</b>	25.4	30.7	42.1	54.6	64.5	73.6	78.6	76.1	67.6	56.4	42.2	29.4

<b><u>Climate Station</u></b>	<b><u>Location</u></b>	<b><u>From</u></b>	<b><u>To</u></b>
KS1408	Centralia, KS	1961	1990
KS3759	Holton, KS	1961	1990
KS4559	Lawrence, KS	1961	1990
KS8563	Wamego, KS	1961	1990
NE0435	Auburn, NE	1961	1990
NE8905	Wahoo, NE	1961	1990
NE6570	Pawnee City, NE	1961	1990
NE8395	Syracuse, NE	1961	1990

## Soil Interpretations

This group consists of somewhat poorly to well drained, fine to moderately fine textured soils formed mostly from loess, residuum, and glacial till on uplands. They are moderately deep to very deep, permeability is very slow to moderately slow, and available water capacity is moderate to high.

<b>Drainage Class:</b>	Somewhat poorly drained	To	Well drained
<b>Permeability Class:</b> (0 - 40 inches)	Very slow	To	Moderately slow
<b>Frost Action Class:</b>	Moderate	To	High

	<u>Minimum</u>	<u>Maximum</u>
<b>Depth:</b>	20	
<b>Surface Fragments &gt;3" (% Cover):</b>	0	3
<b>Organic Matter (percent):</b> (surface layer)	0.5	6.0
<b>Electrical Conductivity (mmhos/cm):</b> (0 - 24 inches)	0	0
<b>Sodium Absorption Ratio:</b> (0 - 12 inches)	0	0
<b>Soil Reaction (1:1) Water (pH):</b> (0 - 12 inches)	4.5	7.8
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	4	12
<b>Calcium Carbonate Equivalent (percent):</b> (0 - 12 inches)	0	3

**Soil Series**

Armster	Haig	Onowa
Benfield	Irwin	Oska
Bremer	Labette	Otoe
Butler	Ladoga	Padonia
Chase	Ladysmith	Pawnee
Crete	Leanna	Tully
Dwight	Longford	Wamego
Edalgo	Malmo	Welda
Florence	Martin	Wymore
Gosport	Mayberry	
Grundy	Muscotah	

**Adapted Species List**

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many of those species can be accessed on the web at <http://plants.usda.gov/>.

<u>Cool Season Grasses</u>	<u>Symbol</u>		<u>Warm Season Grasses</u>		
Canada wildrye	ELCA4	F	Big bluestem	ANGE	G
Intermediate wheatgrass	THIN6	G	Eastern gamagrass	TRDA3	G
Meadow brome	BRBI2	F	Indiangrass	SONU2	G
Orchardgrass	DAGL	F	Little bluestem	SCSC	F
Pubescent wheatgrass	THIN6	G	Switchgrass	PAVIV	G
Reed canarygrass	PHAR3	F	<u>Legumes</u>		
Smooth brome	BRINI2	G	Alfalfa	MESA	G
Tall fescue	LOAR10	G	Birdsfoot trefoil	LOCO6	F
Tall wheatgrass	THPO7	F	Cicer milkvetch	ASCI4	F
Virginia wildrye	ELVI3	F	Red clover	TRPR2	F

G - Good adaptation for forage production on this group of soils in this MLRA

F - Fair adaptation but will not produce at its highest potential

**Production Estimates**

Production estimates listed here should only be used for making general management recommendations. On site production information should always be used for making detailed planning and management recommendations.

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The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields, and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

The production estimates listed below represent total annual above ground plant production on an air-dry-matter basis. Estimates of hay and grazing yields can be calculated from these numbers by multiplying them by a harvest efficiency. A 70 percent harvest efficiency is commonly used when converting to hay yields. Pasture harvest efficiency is highly dependent on the grazing management system applied, ranging from 25 to 50 percent.

Forage Crop	Management Intensity	
	Low (lbs/ac)	High (lbs/ac)
Alfalfa	6300	16000
Alfalfa/Cool Season Grass	4000	14300
Big bluestem	3400	14300
Eastern gamagrass	4300	14300
Smooth brome grass	4000	9400
Switchgrass	3100	11400
Tall fescue	3700	9100

### Forage Growth Curves

Growth curves estimate the seasonal distribution of growth of the various forage crops. They indicate when the forages may be available for grazing or mechanical harvest.

**Growth Curve Number:** NE0601

**Growth Curve Name:** Alfalfa

**Growth Curve Description:** Alfalfa - MLRAs 107, 106, 75, irrigated 73, 72

<u>Percent Production by Month</u>											
<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	10	25	25	20	15	5	0	0	0

**Growth Curve Number:** NE0602

**Growth Curve Name:** Cool-season grass

**Growth Curve Description:** Cool-season grass fertilized early - MLRAs 107, 106, 75, irrigated 73, 72

<u>Percent Production by Month</u>											
<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	5	10	35	30	5	5	10	0	0	0

**Growth Curve Number:** NE0603

**Growth Curve Name:** Warm-season grass

**Growth Curve Description:** Warm-season grass - statewide

<u>Percent Production by Month</u>											
<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	15	30	30	15	5	0	0	0

**Growth Curve Number:** NE0604

**Growth Curve Name:** Eastern gamagrass

**Growth Curve Description:** Eastern gamagrass - statewide

<u>Percent Production by Month</u>											
<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	10	35	40	15	0	0	0	0	0

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SECTION II

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### **Soil Limitations**

#### Water Holding Capacity

- Water holding capacity ranges from moderate to high on these soils. Forage production on soils of moderate water holding capacity will be noticeably affected during dry growing seasons.

#### Drainage

- Somewhat poorly and moderately well drained soils will be more prone to compaction and plant damage if grazed or machinery is operated on them during wet periods.

#### Permeability

- The very slow to moderately slow permeability results in high and very high runoff potential on sloping soils. These heavy clay soils provide a less than ideal rooting zone.

### **Management Interpretations**

#### Water holding capacity

- When establishing new stands on soils with moderate available water holding capacity select forage species that are tolerant to periods of drought and inadequate soil moisture.

#### Drainage

- On somewhat poorly and moderately well drained soils exclude livestock and machinery during extended wet periods to reduce compaction.

#### Permeability

- Include sod-forming species in plantings to reduce runoff. Select species adapted to heavy, clayey soils.

### **FSG Documentation**

#### **Inventory Data References:**

Agriculture Handbook 296-Land Resource Regions and Major Land Resource Areas

Natural Resources Conservation Service (NRCS) National Water and Climate Center data

USDA Plant Hardiness Zone maps

National Soil Survey Information System (NASIS) database for soil surveys in Nebraska and Kansas counties in MLRA 106

Nebraska and Kansas NRCS Field Office Technical Guide

NRCS National Range and Pasture Handbook

Various Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production.

#### **State Correlation:**

This site has been correlated with the following states:

KS

NE

**Forage Suitability Group Approval:**

Original Author: Tim Nordquist

Original Date: 2/27/01

Approval by:

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State Range Management Specialist

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Date

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State Range Management Specialist

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Date